Nottingham Trent University

School of Science and Technology

ChefUP:

Connecting Culinary Enthusiasts with Chefs

by

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of the requirements for the degree of

Bachelor of Science with Honours

In

Software Engineering

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# **Abstract**

ChefUP is a mobile application designed to facilitate direct, in-person learning experiences between culinary professionals and learners. Developed using Android Studio and integrating Google Maps API, along with Firebase services such as Firestore Database, Authentication, and Storage, the application serves a dual purpose. It enables chefs to host cooking sessions at designated locations, visible to learners who are nearby the specified location. Once a session is selected and accepted by a learner, the necessary contact details are provided to finalise arrangements for the meet-up. This interactive system supports session booking, real-time updates, and a history log where completed sessions are saved and reviewed. Additionally, learners are allowed to rate their experience, enhancing the community-driven reputation mechanism inherent to the platform. ChefUP addresses the gap in hands-on culinary training accessible locally, by providing a user-friendly platform that connects learners with professional chefs in their vicinity.

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# **Chapter 1: Introduction**

In an era where digital media dominates the culinary learning landscape for the casual culinary enthusiast, there remains a notable gap in how cooking skills are traditionally acquired versus how they are taught in the modern day. Despite the proliferation of online video guides and digital recipe collections, a significant segment of culinary enthusiasts continues to seek more tangible, hands-on learning experiences. These individuals prefer direct interaction over passive observation, a need that current digital solutions do not fully satisfy. The gap identified here is the lack of real-world interaction and personalised guidance available through conventional cooking apps, which primarily focus on providing recipes and video tutorials without teaching the nuances of cooking with proper practice.

Since the internet and social media has attracted a melting pot of a community, the younger generation loves to experience different cultural dishes from other countries. Not only does it provide a specialised application that caters to the culinary enthusiast who wishes to learn from experienced professionals.

While digital learning is based subjectively on the media being consumed, a hands-on learning experience is still favoured especially by the older generation, ChefUP serves to combat that problem by introducing direct interaction between users and certified chefs. This personalised approach to culinary education has the potential to provide valuable insights, guidance, and feedback to users, allowing them to progress on their culinary journey effectively.

## **1.1 Background and Rationale**

Historically, culinary skills were imparted in a hands-on manner, from generation to generation or under the tutelage of master chefs. In recent years, the surge in digital media has democratised access to culinary knowledge, yet the essential experiential component of learning—actual cooking remains underserved. This gap is particularly evident when considering the needs of culinary enthusiasts who seek more than just observational knowledge; they need interaction and feedback which current platforms do not provide adequately.

There is a written dissertation exploring “Cooking to Learn” and “Learning to Cook”, within the context of higher education as a whole, sustainability education looks for methods to encourage the development of sustainable communities as a potential solution to the global decline in ecological and social problems (O’Neil, 2015). What this means is as the world changes, new methods are made to address problems in the context of development and education, ChefUP is an application designed to tackle new world problems as the world progresses.

The introduction of ChefUP aims to meld the convenience of digital access with the irreplaceable value of in-person learning experiences. This platform is not just another cooking app; it is a bridge between traditional culinary education and modern technology, designed to bring learners and professional chefs together in a real-world setting.

## **1.2 Overview**

ChefUP is introduced as a solution designed to bridge this gap by enabling direct engagement between learners and professional chefs. Unlike traditional cooking apps, ChefUP facilitates physical meetups and real-time cooking sessions, offering a platform where culinary skills can be authentically learned and honed under the guidance of certified chefs. This approach not only caters to the growing demand for personalised educational experiences but also enriches the culinary journey of each user by allowing them to engage actively with experts in the field.

## **1.3 Aims and Objectives**

The primary aim of the ChefUP project is to develop a standalone mobile application that enriches the culinary education landscape by introducing an interactive and hands-on experience in cooking sessions between learners and professional chefs. ChefUP is a supplementary tool to traditional culinary education, enhancing rather than replacing formal training methods.

ChefUP's objectives revolve around transforming the culinary learning experience by connecting culinary enthusiasts with certified chefs, providing hands-on cooking sessions, personalised guidance, and a platform for diverse culinary exploration.

* To improve the learning experience for culinary enthusiasts by facilitating direct interaction between users and certified chefs.
* To offer a hands-on approach to cooking education by enabling users to engage in physical cooking sessions with expert chefs.
* To provide users with personalised guidance, insights, and feedback from certified chefs, enhancing their cooking skills effectively.
* To cater to the diverse culinary interests of users by offering a platform for experiencing and learning various cultural dishes.
* To bridge the gap between home cooks and professional chefs, allowing enthusiasts to benefit from the expertise and experience of culinary experts.
* To serve as a supplementary resource for culinary education, acknowledging that ChefUP complements formal culinary training and does not seek to replace it.
* To simplify the process of planning, scheduling, and coordinating cooking sessions between users and chefs through the application.
* To enhance the overall user experience by providing a convenient and accessible platform for culinary education.

To investigate and understand the specific requirements and needs of chefs, aiming to make their experience on ChefUP better and more efficient.

Each of these objectives is directed towards creating a more engaged and knowledgeable culinary community, enhancing the overall educational journey of each user by leveraging the capabilities of modern mobile technology. ChefUP will be an interactive culinary education that aligns with the needs and preferences of today’s learners.

## **1.4 Justification**

The ChefUP application project was conceived and developed to address several key areas of need and opportunity in the culinary and educational technology sectors. This section outlines the primary motivations and rationale behind the project:

* **Enhancing Culinary Education Accessibility:** ChefUP aims to ease the learning and teaching of culinary skills by providing a platform where individuals, regardless of their geographical location or economic status, can access culinary education from certified chefs. This is not a replacement for formal culinary education, but it does bridge the gap for casual learning and formal education.
* **Leveraging Technology for Community Building:** There is a growing trend towards using digital platforms to foster a community and share skills. ChefUP taps into this trend by offering a community-centric platform that allows for the exchange of cooking knowledge.
* **Fulfilling a Market Gap:** While there are numerous cooking websites and tutorials available online, there is a scarcity of platforms that provide in person, interactive cooking sessions with on-the-spot feedback. ChefUP fills this gap by allowing chefs to host live sessions and learners to gain hands-on experience, which is more effective for skill acquisition compared to passive watching.
* **Supporting the Gig Economy:** The rise of the gig economy has seen many professionals offering their skills on a freelance basis. ChefUP provides chefs with a platform to monetise their culinary skills in a flexible manner, aligning with modern work preferences and supporting economic sustainability.
* **Promoting Cultural Exchange:** Food is a universal language that transcends cultural boundaries. By enabling chefs from various cultural backgrounds to share their unique cooking styles and culinary traditions, ChefUP promotes cultural understanding and appreciation among its users.
* **Social Impact:** By providing this approach of accessible culinary education, ChefUP has the potential top provide individuals with valuable cooking skills that may provide more convenience to the users.

Each of these points justifies the development of the ChefUP application not only as a viable business product but also as a socially beneficial tool that leverages technology to create meaningful, positive changes in everyday life. The project aligns with current technological advancements and social trends, making it both relevant and timely.

## **1.5 Structure of the Dissertation**

This report provides a comprehensive summary of the final year project, chronicling its progress and development over the project's duration.

The first chapter introduces the project, establishing the context and the motivations behind it. It lays out the objectives and scope of the project, providing a clear blueprint of the intended research and development areas.

Chapter two engages in a thorough analysis of the current state of culinary education platforms, interactive learning environments and culinary history. It reviews existing literature and digital sources to capture the latest trends and technologies that are shaping online culinary platforms, identifying their limitations and how they relate to the objectives of this project.

In the third chapter, the report transitions from theoretical research to practical application by outlining the development of new concepts derived from the identified gaps and limitations. It details the project planning process and conducts a full analysis of project requirements. This chapter also addresses potential risks that could impact the project, culminating in the identification and definition of the project’s key features.

Chapter four delves into the implementation phase of the project. It discusses the design methodologies, programming languages, and software tools employed during the development. This chapter highlights significant challenges encountered during implementation and the solutions adopted to address them. The development processes of the android application, its database, and critical features are elaborated upon in detail.

Chapter five discusses the outcomes of the testing and evaluation phases designed to validate the functionality and performance of the platform against the predefined requirements. This evaluation is conducted in two distinct phases: internal tests by the developer and external tests by independent users, ensuring a robust and objective assessment of the platform's capabilities.

The sixth chapter summarises the project's results, assessing its success against the initial objectives and discussing the project's impact and effectiveness. This final chapter also explores potential avenues for future development, suggesting enhancements and expansions that could further the utility and reach of the platform.

# **Chapter 2: Context and Background**

This chapter delves deeper into the broader context of the ChefUP project by examining existing technologies and applications, identifying new opportunities for their application in enhancing culinary skills, and critically assessing the necessity of this project. Through a review of existing solutions and supported by recent research, this section substantiates the project’s objectives and highlights its potential impact on the culinary learning landscape.

## **2.1 Existing Solutions in Culinary Education and Services**

**Masterclass:** This platform offers an array of culinary courses led by renowned chefs. While providing high-quality content, Masterclass is designed for passive consumption, focusing on the appreciation of culinary arts without offering interactive or hands-on cooking experiences. This underscores a significant gap for platforms that facilitate active participation in cooking, making it evident there is room for more engaging educational tools in the culinary field (Adams et al., 2015).

**UberEats:** As a food delivery service, UberEats connects users with a variety of restaurants, emphasising convenience over educational value. It lacks features that promote the development of cooking skills or direct interaction with culinary professionals, diverging from ChefUP's educational objectives. This service model, while convenient, contributes to a less health-conscious lifestyle by encouraging reliance on prepared foods.

To be fair, the main objective of UberEats is the convenience of food delivery to the user’s doorstep, it has similar design adjacent philosophies to ChefUP while tackling a completely different problem. However, it is still an application worth bringing up for the sake of this discussion. With similar approaches and parallels, “Learners” with “Delivery Personnel” and “Chefs” with “Restaurants”, it serves as a good foundation on how to structure the application to reach the requirements stated before.

**Meet n Eat:** Focused on restaurant discovery and social interaction, Meet n Eat helps users locate and book dining experiences and read restaurant reviews. Similar to UberEats, it enhances the dining experience externally but does not support users in developing cooking skills themselves, illustrating a missed opportunity for fostering culinary self-sufficiency.

## **2.2 Historical Context of Cooking Skills Development**

The evolution of cooking skills is a fundamental aspect of human history, deeply intertwined with cultural transformations and technological advancements. Understanding the historical context of cooking provides essential insights into the socio-cultural shifts that have influenced culinary practices and education over time.

### **2.2.1 Evolution of Cooking Practices:**

The development of cooking skills has been critical to human survival and social organisation. Early humans started with basic techniques such as roasting over open fires, evolving to more sophisticated methods including baking, boiling, and frying as tools and technologies advanced. This progression from raw food consumption to complex cooking methods significantly impacted health, nutrition, and societal structures.

### **2.2.2 Cultural Significance and Transmission:**

Cooking has always been more than just a means to prepare food. It carries deep cultural significance, often seen as an art form and a way to preserve heritage. Traditionally, cooking skills were passed down through generations, often within family settings, with mothers usually playing a pivotal role in this educational chain. This transmission not only ensured the survival of cultural culinary traits but also reinforced familial bonds and community cohesion.

### **2.2.3 Impact of Industrialisation and Modernisation:**

The industrial revolution introduced mass production of food and a shift towards convenience-based cooking. This era marked a significant transformation in how societies approached food preparation, leading to the widespread availability of processed foods. The convenience that processed foods offered led to a gradual decline in cooking skills among the general population, as noted in the comprehensive study by Lavelle et al. (2016). As families became busier and women increasingly joined the workforce, the transmission of cooking skills from parents to children became less prevalent.

### **2.2.4 Current Trends and Challenges:**

In contemporary times, there has been a resurgent interest in home cooking, driven by health awareness and a growing understanding of nutrition. However, this interest clashes with the reality of diminished cooking skills among the younger generations. The study highlights that individuals who learned cooking skills in childhood or adolescence possess better culinary competence and dietary habits than those who learned later in life. This points to the importance of early culinary education in fostering lifelong healthy eating habits and the preservation of culinary heritage (Lavelle et al., 2016).

### **2.2.5 Necessity for Revitalised Cooking Education:**

Given the reported decline in domestic culinary skills and the shift away from traditional learning sources, there is a crucial need for structured cooking education. Modern educational platforms like ChefUP can bridge the gap by reintroducing essential cooking skills to both children and adults, ensuring that practical culinary education adapts to contemporary needs while reinforcing healthful eating practices.

The historical perspective on cooking skills reveals a complex interplay of cultural evolution, technological advancement, and societal changes. Today, as we face the dual challenges of health crises and cultural erosion, revitalising cooking education through innovative platforms like ChefUP becomes not just beneficial but necessary. By embedding historical cooking skills within modern educational frameworks, ChefUP aims to empower individuals to reclaim their culinary heritage and improve their health, echoing the timeless importance of cooking as a critical life skill.

## **2.3 Supporting Research and Rationale**

Recent studies underscore the importance of cooking skills for healthy eating and managing obesity, especially in low-income groups. Research indicates that poor cooking skills can lead to an increased reliance on convenience foods, which are often less healthy (Adams et al., 2015). Additionally, the decline in cooking skills and confidence over time, spurred by the easy availability of cheap, pre-prepared meals, can discourage the development and maintenance of cooking skills.

### **2.3.1 Findings from the UK National Diet and Nutrition Survey:**

**Cooking Skills Decline:** The survey revealed that while a significant portion of the population can prepare basic meals, there is a substantial decline in more complex cooking skills and confidence, particularly among younger and male demographics (Adams et al., 2015).

**Impact on Dietary Quality:** There is a strong correlation between infrequent cooking and poorer dietary quality, which can contribute to health issues such as obesity (Adams et al., 2015).

**Gender Disparities:** Women are more likely to possess cooking skills and engage in meal preparation compared to men, indicating a gender divide in culinary proficiency.

These insights emphasise the need for interventions like ChefUP that aim to improve cooking skills through direct and practical learning methods.

### **2.3.2 Enhanced Learning through Video Technology**

A study on the role of video technology in the development of cooking skills provides valuable insights into how digital tools can enhance learning in the culinary field. Participants in this study indicated that video technology improved comprehension, offered real-time reassurance, assisted in acquiring new skills, and enhanced the enjoyment of the cooking process (Surgenor et al., 2017). This supports the use of video in cooking education as an effective method to increase confidence and motivation, particularly among those with lower skill levels.

The convenience factor, coupled with societal shifts towards faster, more efficient ways of living, has led to a reduction in time spent preparing meals at home (Caraher and Lang, 1999; Jackson and Viehoff, 2016). This societal trend underscores the necessity for ChefUP, which facilitates hands-on learning to make the acquisition of cooking skills more accessible and engaging.

### **2.3.3 Importance of Early Learning in Cooking Skills**

According to Lavelle et al. (2016), acquiring cooking skills early in life significantly impacts long-term dietary habits and health outcomes. Learning these skills from childhood not only enhances skill retention but also instils a positive attitude towards cooking, which correlates with healthier eating patterns. The primary learning source for many remains the family, particularly mothers, underscoring the role of family in culinary education. This points to the critical need for ChefUP to provide foundational cooking skills that might otherwise not be passed down due to the generational loss of cooking proficiency.

### **2.3.4 Impact of Learning Sources on Cooking Skills**

The source from which one learns cooking skills profoundly impacts their confidence and ability in the kitchen. Those who learn from family members, especially mothers, tend to have better cooking skills and dietary habits (Lavelle et al., 2016). However, with the changing dynamics in family structures and the busy lifestyles of modern families, there is a significant decrease in the transmission of these skills from parents to children. This gap further justifies the development of ChefUP as a means to supplement traditional family-based teaching methods.

This extensive background provides a solid foundation for the development of ChefUP, positioning it as a necessary innovation in the culinary education sector. By integrating empirical research and identifying gaps in current culinary education platforms, ChefUP is designed to enhance hands-on learning and improve dietary outcomes. It aims to provide engaging and interactive culinary experiences that are crucial for fostering effective learning and promoting healthier lifestyles. The integration of empirical research into this context highlights the pressing need for innovations like ChefUP, which not only address current deficiencies in culinary education but also offer scalable solutions to improve dietary habits and reduce health disparities linked to poor nutrition.

# **Chapter 3: New Ideas**

This section of the report encapsulates the aspects of the ChefUP project, a mobile application designed for a culinary learning experience by integrating hands-on sessions with professional chefs and leveraging modern-day technology. Through comprehensive analysis provided in the "Context and Background" chapter, it becomes evident that while there are existing platforms offering culinary education, such as Masterclass, and services that enhance culinary convenience, like UberEats, a significant gap remains in providing a truly interactive, educational cooking experience. ChefUP was made to fill this gap by prioritising real-world engagements, thus improving the user’s culinary skills, which is essential for healthy living and sustainable eating practices.

This chapter outlines the project's core functions, including a detailed description of the application's functionality, user interaction design, and the technical framework. It builds upon the foundational research discussed previously, aligning the technological development with educational theories and user-centered design principles. The proposed solutions not only draw inspiration from existing digital culinary platforms but also introduce novel features that prioritise active learning, user engagement, and accessibility.

The discussion will detail the application’s unique features such as real-time session tracking, location-based session scheduling, and community-driven learning enhancements. This section will also explain the methodology behind the app's development, from requirement gathering to user interface design, and will justify the chosen approaches by comparing them with alternative solutions. By the end of this chapter, the reader will have a comprehensive understanding of what ChefUP aims to achieve, how it differentiates itself from existing market solutions, and how users will interact with the app to enhance their cooking skills and dietary habits.

## **3.1 Benefits and Real-World Impact**

The benefits and real-world impact of ChefUP are manifold, drawing from the insights provided by Plessz and Étilé (2018), which analyse the modern decline in time devoted to household cooking in Western societies, including the United States and France. ChefUP, by promoting streamlined and efficient cooking practices, addresses the contemporary trend of reduced cooking times which has been influenced by busier lifestyles and a shift in meal consumption behaviours.

### **3.1.1 Benefits of ChefUP**

**Convenience:** ChefUP addresses the significant reduction in time households spend on cooking, which Plessz and Étilé (2018) attribute to both a shift in population characteristics and changes in behavioral patterns. By integrating a community driven system of chefs proposing food preparation sessions, ChefUP makes learning cooking more accessible and less time-consuming, directly appealing to users who have limited time to devote to cooking.

**Promotion of Healthier Eating Behaviours:** The decline in cooking time has also been associated with a shift towards less healthy eating practices, as meals become more about convenience than nutrition (Plessz & Étilé, 2018). ChefUP counters this by encouraging the preparation of nutritious meals through guided cooking lessons and nutritional information, thus promoting healthier eating habits.

**Uniqueness in the Market**: As noted by Plessz and Étilé (2018), the decline in cooking time is part of a broader change in household behaviour across various Western cultures. Most current apps focus either on high-end cooking skills or on quick meal deliveries. ChefUP fills a unique niche by combining the convenience of quick recipes with the benefits of learning cooking skills, thus addressing both the need for speed and the desire for healthier, home-cooked meals.

### **3.1.2 Real-World Impact:**

ChefUP's real-world impact is expected to be substantial, particularly in how it addresses the modern challenges associated with cooking and eating practices:

**Time Efficiency:** By streamlining the booking process and reducing the preparation time, ChefUP makes it feasible for users to learn cooking, even within their hectic schedules. This directly addresses the trend highlighted by Plessz and Étilé (2018) where there is a noted reduction in time spent cooking across several decades due to demotivation of engaging with online supplementary material or video tutorials, an audience of casual learners exist that wish for a more in-person learning experience.

**Health and Nutrition:** With a focus on balanced meals and cooking from scratch, ChefUP can play a crucial role in combating the rise in diet-related health issues by making home cooking more practical and less daunting for the average user. This can be achieved by regulating the sessions that are being made within the application, conforming to a country’s food and health regulations such as the Food Standards Agency present in the United Kingdom.

**Cultural Preservation of Cooking:** While the practice of cooking has seen a decline as a central feature of meal consumption in places like the USA, ChefUP can help reverse this trend by reintegrating cooking as an integral part of daily routines, thus helping to maintain culinary skills that are at risk of being lost. With the melting pot of cultures that exist in western countries nowadays, more people can experience learning to cook authentically and loving the culture that comes with it.

In essence, ChefUP not only provides a practical solution to modern problems but also promotes a healthier, more engaged approach to cooking and eating that is crucial in today’s fast-moving world.

## **3.2 Scopes**

The scope of the ChefUP project encompasses the core features, functionalities, and objectives necessary to empower users to enhance their culinary skills through interactive and educational content. This section defines the key components within the app's scope and clarifies aspects that fall outside the defined boundaries.

### **3.2.1 In Scope**

* **User Registration and Profile Management:**
  + Implementation of a user registration system to allow users to create and manage their profiles.
  + Features to manage personal information, culinary preferences, and learning progress.
* **Recipe, Equipment, and Ingredient Management:**
  + Development of a comprehensive database allowing users to explore various recipes.
  + Features for users to manage lists of necessary equipment and ingredients for each recipe.
* **Certification Validation System:**
  + Integration of a system to verify culinary certifications for chefs, ensuring credibility and trust within the platform.
* **Interactive Learning Modules:**
  + Creation of interactive, step-by-step cooking lessons that users can follow to learn new recipes and techniques.
  + Utilisation of images to enhance learning experiences.
* **Social Interaction Features:**
  + Implementation of an online chat system to allow interaction between home cooks and professional chefs.
  + Features for users to share their culinary creations and experiences with the community.
* **Geolocation Services:**
  + Integration of a free geolocation API to help users locate and connect with local culinary events or classes.
* **Secure Transaction System:**
  + Development of a secure payment gateway to facilitate transactions for paid lessons, donations, or purchasing culinary items.
* **Administrative and Moderation Tools:**
  + Features for administrators to oversee platform activities and manage user interactions.
  + Systems to report and resolve issues, ensuring a safe and respectful learning environment.
* **Ratings and Feedback Mechanism:**
  + Development of a rating system for users to evaluate lessons and chefs, enhancing quality and engagement on the platform.

### **3.2.2 Out of Scope:**

* **Advanced Dietary Management:**
  + Integration of features for detailed nutritional tracking or diet planning.
  + Custom meal planning based on advanced health metrics.
* **Third-Party E-commerce Integrations:**
  + Partnerships with external food delivery services or cooking equipment suppliers for direct ordering through the app.
  + Live Streaming of Cooking Sessions:
  + Real-time broadcasting of cooking lessons or culinary events.
* **Complex Machine Learning Algorithms:**
  + Development of predictive algorithms for user behaviour or personalised recipe recommendations.
* **Multi-Language Support:**
  + Implementation of the application in multiple languages beyond English in the initial release.

**MoSCoW Methodology Application:**

* **Must Have:** User registration and profile management, recipe and ingredient database, basic chat functionality, and secure payment system.
* **Should Have:** Interactive learning modules, certification validation, administrative tools, and a rating system.
* **Could Have:** Geolocation services for local events and social sharing capabilities.
* **Won't Have:** Advanced dietary management, third-party e-commerce integrations, and multi-language support.

By defining these scopes, ChefUP is designed to be a comprehensive platform that not only enables users to learn cooking skills but also to connect, share, and grow within a community of culinary enthusiasts. The project is focused on delivering a user-friendly, engaging, and educational experience that aligns with the needs and expectations of its target audience.

## **3.3 Constraints**

The constraints for the ChefUP app delineate the boundaries within which the app's development and deployment must operate. Addressing these constraints effectively is crucial to ensuring that ChefUP adheres to technical, regulatory, and operational standards, thereby delivering a robust, user-centric experience that aligns with the highest quality and reliability standards.

**Data Privacy and Security:**

* Compliance with global data protection regulations such as GDPR.
* Implementation of secure authentication and authorisation mechanisms.
* Encryption of sensitive user data, including personal and payment information.

**Performance and Reliability:**

* Optimisation of application performance to handle high user loads smoothly.
* Ensuring high reliability and uptime of the server, especially during peak user interactions.
* Efficient management of data transactions to prevent any performance bottlenecks.

**User Experience and Interface:**

* Development of an intuitive and user-friendly interface suitable for all levels of culinary expertise.
* Ensuring consistent and responsive design across various devices and screen sizes.
* Implementation of accessible design practices to accommodate all users, including those with disabilities.

**Content Accuracy and Quality:**

* Verification of all culinary content, including recipes and tutorials, to ensure accuracy and safety.
* Regular updates and reviews of content to maintain relevance and quality.
* Incorporation of user feedback mechanisms to improve content quality based on community input.

**Scalability:**

* Designing backend infrastructure that can scale efficiently as user base grows.
* Implementing a scalable cloud database solution to manage large volumes of data without degradation of service.
* Planning for incremental scalability to accommodate new features and expansions in the future.

**Regulatory Compliance:**

* Adhering to food and safety regulations relevant to culinary education.
* Ensuring all in-app purchases comply with international financial transaction guidelines.
* Regular audits to verify compliance with all applicable laws and standards.

**Cross-Platform Compatibility:**

* Ensuring the app functions seamlessly on both iOS and Android platforms.
* Extensive testing on multiple devices to guarantee compatibility and optimise performance.
* Addressing platform-specific nuances and ensuring uniform functionality and aesthetics.

**Technological Constraints:**

* Selection of appropriate technology stack that supports interactive features such as live streaming and real-time chat.
* Integration with third-party APIs for functionalities like geolocation and payment processing.
* Future-proofing the app by adopting technologies that allow easy updates and integrations.

**Resource Allocation and Timeline:**

* Effective management of development resources to stay within budget and timelines.
* Prioritisation of project phases using Agile methodologies to ensure timely delivery of critical features.
* Continuous assessment of project milestones to adjust resources and schedules as needed.

**Community Engagement and Feedback:**

* Designing mechanisms for user engagement and community building within the app.
* Implementing systems for collecting, analysing, and acting on user feedback.
* Encouraging active participation through user-driven content and features.

These constraints serve as the foundational pillars for the development of ChefUP, guiding decision-making processes and resource allocation to ensure the project's success within established technical, regulatory, and operational limits. By addressing these constraints head-on, ChefUP aims to deliver an educational and interactive culinary platform that meets the expectations of its users and maintains the highest standards of quality and functionality.

## **3.4 Functional Requirements**

**1. User Authentication**

* **FR1.1:** Users must be able to register an account using an email and password.
* **FR1.2:** Users must be able to log in using their registered email and password.
* **FR1.3:** The system must verify email addresses during the registration process.
* **FR1.4:** Users should be able to reset forgotten passwords using their email address.
* **FR1.5:** The system must provide a logout functionality.

**2. User Roles**

* **FR2.1:** Users must be identified distinctly as either a "Chef" or "Learner" based on their selected role during registration.
* **FR2.2:** Users should be able to view and edit their own profile information according to their role.

**3. Session Management**

* **FR3.1:** Chefs must be able to create cooking sessions with details such as session time, ingredients needed, and location.
* **FR3.2:** Learners must be able to view available cooking sessions and filter them by location or chef.
* **FR3.3:** Learners must be able to enroll in cooking sessions.
* **FR3.4:** Chefs must be able to view a list of learners who have joined their sessions.
* **FR3.5:** Chefs and learners must receive notifications upon new enrollments or session changes.

**4. Ratings and Reviews**

* **FR4.1:** Learners must be able to rate chefs after attending a session.
* **FR4.2:** The system must calculate and display an average rating for each chef based on received ratings.

**5. Real-Time Updates**

* **FR5.1:** Session details must update in real time to reflect changes made by the chef or interactions by the learners.
* **FR5.2:** The system must support real-time messaging between enrolled learners and the chef for each session.

**6. Navigation and Maps Integration**

* **FR6.1:** The application must integrate maps to display the location of each cooking session.
* **FR6.2:** Users should be able to get directions to the session location through the app.
* Non-Functional Requirements of ChefUP Application

## **3.5 Non-Functional Requirements**

**1. Usability**

* **NFR1.1:** The app should be user-friendly with intuitive navigation and accessible information.
* NFR1.2: The user interface must be responsive and adapt to different device sizes and orientations.

**2. Performance**

* **NFR2.1:** The app should load content and respond to user interactions within 2 seconds.
* **NFR2.2:** The system should handle up to 1,000 concurrent users without performance degradation.

**3. Security**

**NFR3.1:** User data must be transmitted securely using SSL encryption.

**NFR3.2:** Passwords must be hashed before storing in the database.

**NFR3.3:** The application must comply with data protection regulations applicable in the users' country.

**4. Scalability**

* **NFR4.1:** The system should be scalable to support an increase in user base and data volume without significant changes to the system.
* **NFR4.2:** The database should be capable of scaling up to handle increased loads from user interactions and data storage.

**5. Reliability**

* **NFR5.1:** The application should have an uptime of 99.9%, excluding scheduled maintenance.
* **NFR5.2:** The system should be able to recover from common errors without user intervention.

**6. Maintainability**

* **NFR6.1:** The code should be well-documented and adhere to coding standards to facilitate maintenance and future upgrades.
* **NFR6.2:** The system should be modular to allow independent updates and maintenance of different features.

## **3.6 Software Interfaces**

For ChefUP, the software interfaces define how the app interacts with other software systems and services. This is crucial for ensuring seamless functionality across various components that support the app’s features.

* **Firebase:** Used for user authentication, storing user profiles, recipes, and session data. Firebase's real-time database will facilitate immediate updates and synchronisation across user devices.
* **Stripe and PayPal APIs:** To handle secure and versatile payment options including credit cards and PayPal accounts, ensuring smooth and secure financial transactions within the app.
* **Google Maps API:** Utilised to facilitate location-based services, allowing users to find local cooking classes or ingredients suppliers nearby.
* **Firebase Authentication:** Enabling users to sign up or log in through their existing social media accounts, simplifying the authentication process.
* **Android Studio:** For developing the project aimed at mobile devices.

## **3.7 Hardware Interfaces**

The hardware interfaces for ChefUP involve interactions between the software and the physical devices on which the app operates. This includes:

* **Mobile Devices:** Compatibility with Android and iOS smartphones and tablets, ensuring the app functions smoothly across different hardware specifications, screen sizes, and resolutions.
* **Sensors:** Utilisation of device sensors such as GPS for location services to aid in mapping the nearest culinary classes or events.

## **3.8 Design and Diagrams**

### **3.8.1 Use Case Diagram**

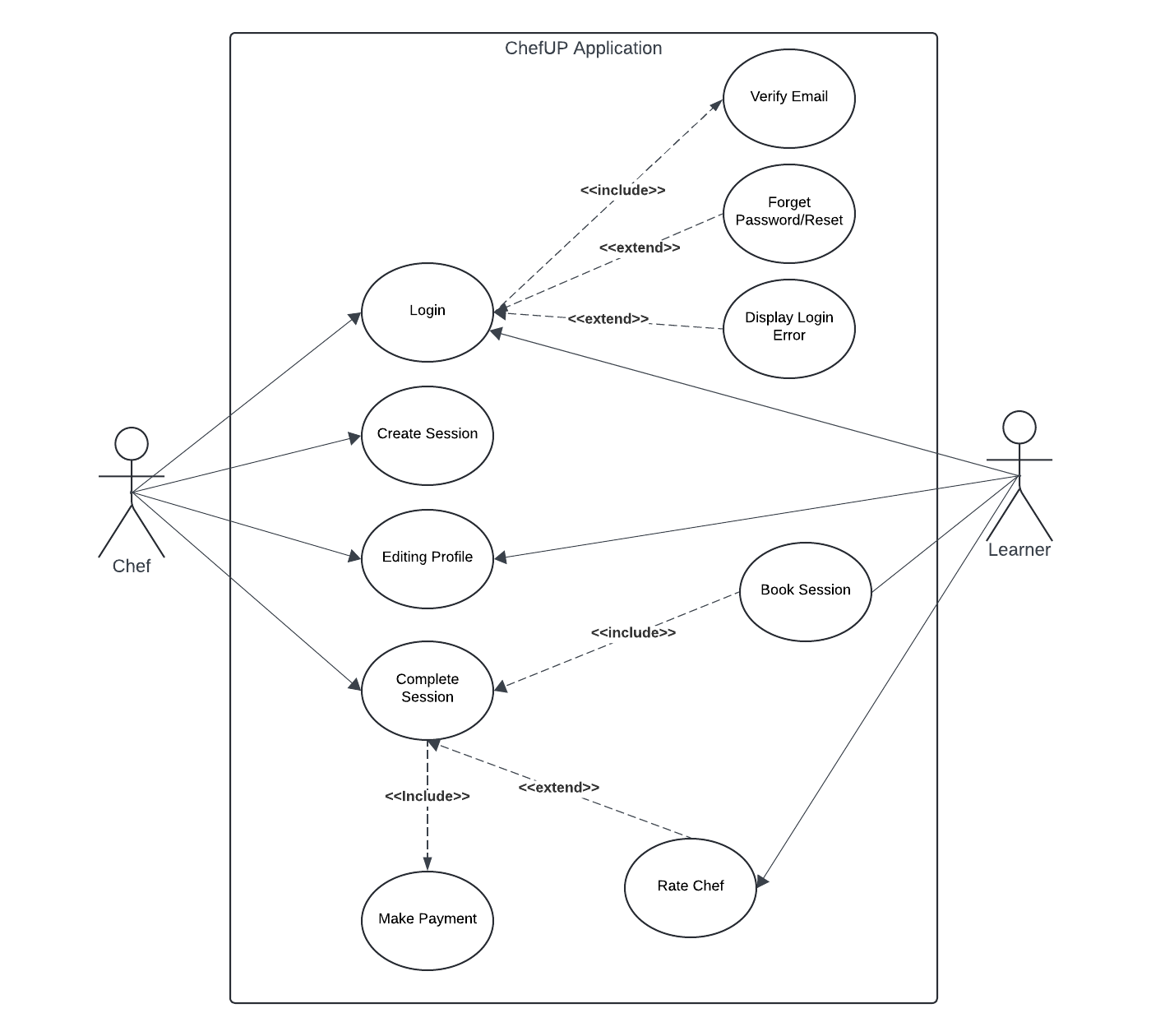


Figure 1. Use Case Diagram for ChefUP.

The Use Case Diagram for the ChefUP application provides a structured visual representation of the interactions between users and the system, delineating the primary functionalities as perceived by the end-users. This diagram distinctly identifies two types of actors within the system: Chefs and Learners.

* **Chefs** can "Login," "Create Session," "Edit Profile," "Complete Session," and "Make Payment." This provides a comprehensive system that allows chefs to manage their offerings and receive compensation. The "Create Session" use case extends to include necessary steps like "Verify Email" for basic authentication, while "Display Login Error" shows an appropriate error message for any unsuccessful logins.
* **Learners** interact with the system through "Login," "Book Session," "Make Payment," and "Rate Chef." The "Book Session" use case shows the process for learners to engage with chefs, the inclusion of "Rate Chef" allows for feedback to maintain quality service.

Overall, this Use Case Diagram is a gateway to understanding ChefUP's functional requirements, providing insight into the application's operational blueprint. It lays out the foundational interactions necessary for a dual-sided platform that caters to both culinary professionals and enthusiasts alike, aiming to enrich the cooking experience through educational engagement.

### **3.8.2 Class Diagram**

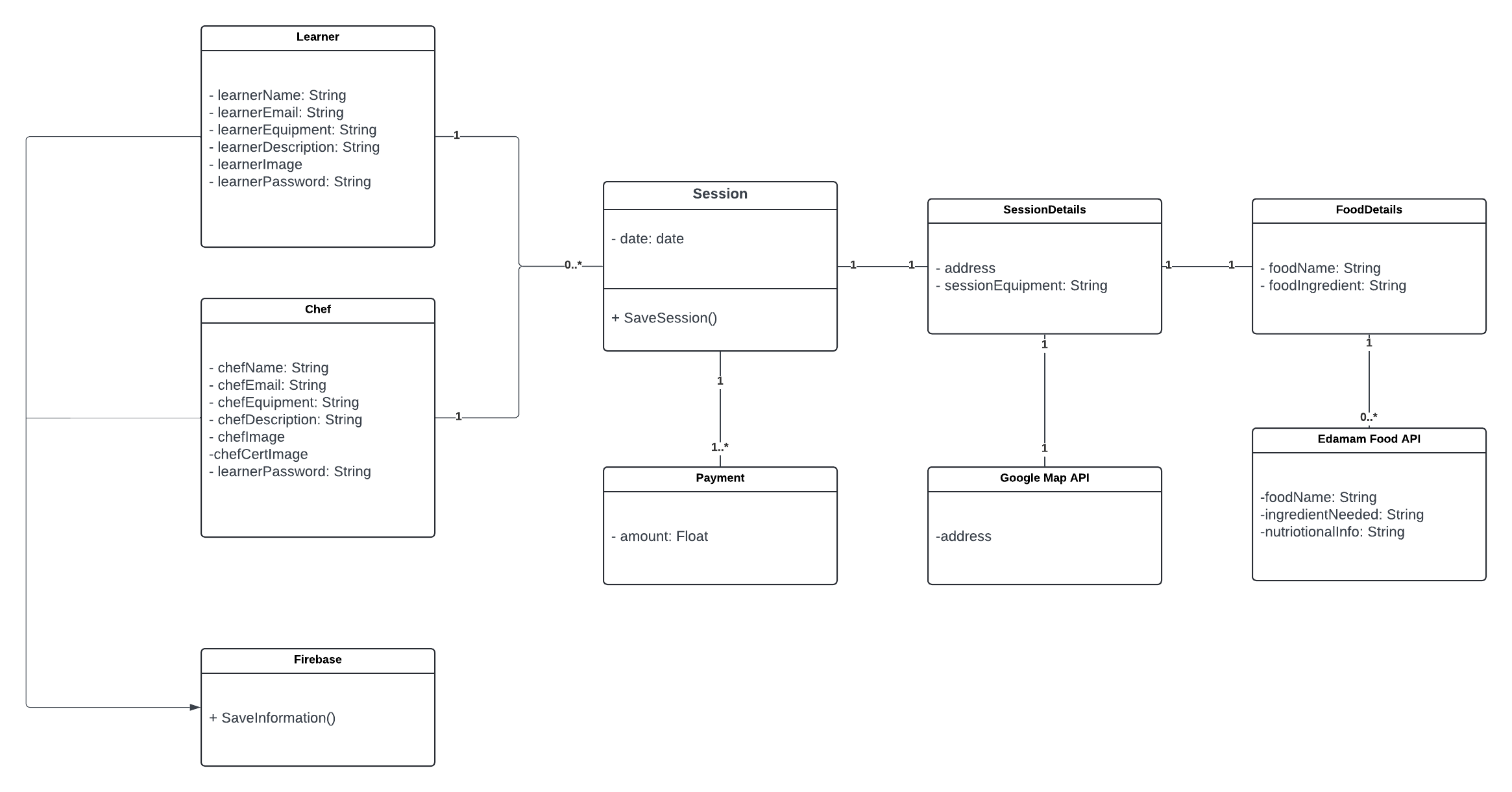


Figure 2. Class Diagram for ChefUP

The class diagram provided for the ChefUP application offers a blueprint of the system's data structure, showing how different entities interact within the domain. In this diagram, the classes reflect core components of the system, detailing attributes and relationships essential to the application's functionality.

**Learner and Chef Classes:**

These classes represent the two principal actors in the system, mirroring the use cases related to user management and profile customisation. Each class contains descriptive attributes such as name, email, description, and image.

**Session Class:**

Acting as a pivotal component in the application, the Session class holds a date attribute and is linked to both the Learner and Chef classes. The method SaveSession() is for saving sessions for display to both users.

This class provides additional specifics about a session, such as its address and sessionEquipment. The direct association with the Session class indicates that each session possesses unique details which are critical for the execution of the culinary events.

Holding attributes like foodName and foodIngredient, this class is seemingly utilised to manage the culinary aspects of the sessions. The connection with the SessionDetails class implies that specific food items are tied to particular sessions.

**Payment Class:**

With a singular amount attribute, the Payment class is evidently used for processing financial transactions within the application. Its association with the Session class suggests that payments are directly related to the booking and completion of sessions.

**Food API Class:**

An integration with a third-party service to enhance the application with additional food-related data, such as nutritionalInfo. The theoretical API that would provide much needed information on the dishes being learned in a session would be Edamam, it provides a diverse amount of information on food, dishes and more.

**Google Map API Class:**

It provides location services, crucial for functionalities like finding the location of a session or tracking the current location of users. Its presence is needed for the application to provide geolocation features.

**Firebase Class:**

This represents the backend-as-a-service platform used for storing user information and session details, as indicated by the method SaveInformation(). Firebase's role is pivotal for authentication, database management, and possibly other backend requirements.

In summary, this class diagram demonstrates a well-thought-out object-oriented design that supports the application's requirements, underlining the ChefUP application's commitment to providing an interactive and comprehensive culinary learning experience.

## **3.9 Initial Designs and Implementation**

For the development of ChefUP, the Agile methodology has been adopted to ensure flexibility, continuous improvement, and iterative development throughout the project lifecycle. This approach is crucial for responding to user feedback and integrating new requirements as the project evolves.

### **3.9.1 Initial Designs**

**A screenshot of a phone

Description automatically generatedA screenshot of a menu

Description automatically generatedFigma for UI/UX Design:**

Figure 3. Initial Figma Designs

**Prototyping:** The initial user interface designs were created using Figma, which allowed for rapid prototyping. Figma's collaborative features enabled real-time feedback and iterations to ensure the design aligns with user expectations and usability standards.

**Design Motif:** The design motif chosen for ChefUP emphasises simplicity and accessibility. The colour palette uses contemporary colours to create a friendly and approachable environment. Typography is clear and readable, with sufficient spacing to enhance readability for users of all ages.

**User Interface Components:**

* **Components Library:** A comprehensive library of UI components was developed in Figma. This includes buttons, input fields, cards for recipes, and navigation bars, which ensure consistency throughout the application and speed up the development process by reusing these elements.

**Implementation Using Agile**

**1. Agile Sprints:**

* **Sprint Planning:** Each sprint began with a planning meeting where the tasks were defined, prioritised, and assigned. The project was divided into two-week sprints, allowing for focused development and regular assessments.
* **Daily Stand-ups:** To maintain momentum and address any issues quickly, daily stand-up meetings were held. These brief sessions helped the team stay on track and facilitated quick adjustments to the work plan based on ongoing progress.

**2. Development Phases:**

* **Phase 1 – Setup and Basic Functionality:**

**User Registration and Profile Management:** Implemented using Firebase Authentication to handle user sign-up and login processes securely.

**Cooking Session Management:** Setup of the database schema in Firebase to store and retrieve recipes and ingredients effectively.

* **Phase 2 – Interactive Features:**

**Online Chat System:** Integration of a basic chat functionality to enable communication between users and chefs.

**Geolocation Services:** Implementation of Google Maps API to assist users in locating cooking classes and ingredients suppliers nearby.

* **Phase 3 – Advanced Features and Refinements:**

**Ratings and Reviews System:** Development of a feedback system for users to rate recipes and chefs, enhancing community trust and engagement.

**3. Testing and Feedback:**

**User Testing:** Throughout the development process, prototypes of the app were tested with potential users to gather feedback. This included usability testing to identify any navigational difficulties or bugs.

**Iterative Refinement:** Based on the feedback, the application underwent multiple iterations. Improvements and additional features were incorporated in subsequent sprints.

By employing Agile methodology, the ChefUP project can adapt to changes swiftly, prioritise user feedback, and incrementally build towards a comprehensive culinary learning platform. The initial designs in Figma have laid a strong foundation for an engaging user experience, setting the stage for a successful implementation and continuous enhancement based on real-world user interactions.

In conclusion, Chapter 3 has delineated a detailed and forward-thinking blueprint for the ChefUP application. The presented designed features and functionalities, user-centered design principles, bridge the current market gap for an on-hands culinary experience. With its unique approach to real-time learning, geolocation integration, and a well-rounded technical framework, ChefUP can be properly implemented and developed smoothly.

# **Chapter 4: Implementation**

Following the detailed project planning and analysis outlined in the previous chapter, this section transitions into the actual implementation of the ChefUP application. This chapter will cover the technological framework, tools, and methodologies employed during the development phase, with a focus on adapting to the unique requirements of ChefUP.

The ChefUP application is designed to ease interaction between chefs and learners interested in cooking. It integrates functionalities such as session management, profile customisation, location-based services, and user ratings, all within a user-friendly mobile interface.

The implementation leverages Android Studio for application development, Firebase for authentication and database services, and the Google Maps API for geolocation features. This combination provides a platform for real-time data handling, user management, and interactive mapping.

## **4.1 Technology Stack**

**Android Studio:** Used as the Integrated Development Environment (IDE) for developing the Android application. It provides tools for coding, debugging, and testing the application efficiently.

**Firebase Authentication:** Manages user registration, login, and email verification, ensuring that user credentials are handled securely.

**Firestore Database:** Stores and retrieves user data such as profile details, session information, and historical data dynamically.

**Firebase Storage:** Utilised for storing images securely, such as profile pictures and chef certification images.

**Google Maps API:** Integrates location-based services, allowing chefs to pinpoint the location for cooking sessions and enabling learners to view sessions nearby within a 25 km radius.

## **4.2 Methodologies**

Software development projects are complex and dynamic, requiring methodologies that can adapt to frequent changes in project requirements and specifications. According to Burtescu et al. (2014), the iterative nature of software development projects is influenced by several factors including the emergence of new business opportunities, misinterpretations of project requirements, and technological advancements. This dynamic environment underscores the necessity for methodologies that accommodate flexibility and continuous improvement.

**Common Methodological Approaches:**

The choice of methodology can significantly influence the success of a software development project. Methodologies can be broadly categorised into traditional models like Waterfall and more agile approaches such as SCRUM and Feature Driven Development (FDD). The Waterfall model, characterised by its sequential phase completion approach, often proves inadequate in handling the fluid requirements typical in software development, thereby leading to its less frequent application in scenarios where flexibility and iterative testing are crucial (Burtescu et al., 2014).

Conversely, Agile methodologies prioritise iterative development, where requirements and solutions evolve through collaboration between cross-functional teams. This is particularly beneficial in managing the complexities and rapid changes often encountered in software development projects.

**Justification for Choosing Agile Methodology for ChefUP:**

For the development of ChefUP, an Agile methodology was adopted, primarily due to its flexibility in handling changing requirements and its emphasis on customer involvement and satisfaction.

**Key reasons for selecting Agile include:**

* **Responsiveness to Change:** Agile allows for regular reassessment of development work, thus accommodating changes more fluidly than rigid methodologies like Waterfall.
* **Incremental Delivery:** ChefUP benefits from Agile’s focus on delivering work in small, consumable increments, allowing for regular feedback and adjustments before the final release.
* **Collaboration and Communication:** Agile promotes frequent communication and close collaboration between developers and business stakeholders, which is crucial in a user-centered project like ChefUP that requires regular input from its end users. Though this is not as considered within the development of this project, it should be mentioned in the context of real-world industry work.

**Implementation of Agile Practices in ChefUP:**

The Agile process for ChefUP involved the following practices.

* **Sprint Planning:** Setting short, iterative phases of work with specific deliverables and review checkpoints to adapt to evolving project needs.
* **Daily Stand-ups:** Facilitating daily notes to visualise the progress, address any impediments, and adjust tasks accordingly.
* **Sprint Reviews and Retrospectives:** At the end of each development sprint, reviewing of the work completed and critical analysis was made on what can be improved in the next sprint.

This approach not only ensures that ChefUP stays aligned with user expectations but also helps in managing the diverse and technically complex aspects of the project efficiently. By incorporating Agile methodologies, the project aligns with industry best practices, enhancing both the development process and the quality of the final product.

## **4.3 Technology**

The development of ChefUP required a combination of modern software tools, hardware platforms, and contemporary programming languages to ease the development of the application. This section outlines the technologies used in the project, explaining the selection rationale and the roles these technologies play in the development process.

### **4.3.1 Programming/Scripting Languages**

To handle various aspects of the application, the following programming and scripting languages were used:

* **Java:** Primary programming language for building the application logic and functionality within Android Studio, chosen for its object-oriented nature, security features, and widespread use in Android app development.
* **Gradle:** Used for dependency management and to automate the building process, improving build speeds and consistency in Android development environments.

### **4.3.2 Software**

The software used in the development of ChefUP includes:

* **Android Studio:** The official Integrated Development Environment (IDE) for Android application development, selected for its comprehensive tools that enhance coding efficiency and its integration with other Google services.
* **Firebase Authentication:** Manages user authentication processes, such as sign-up, sign-in, and password resetting, ensuring secure user access to the application.
* **Firestore Database**: A flexible, scalable database for mobile, web, and server development from Firebase and Google Cloud. It was used to store and sync user profiles, session details, and ratings efficiently in real time.
* **Firebase Storage:** Provides a robust, secure and scalable object storage solution for storing user uploaded content such as images, which is crucial for the profile and certification uploads in ChefUP.
* **Figma:** Utilised for designing prototype UI designs, allowing for rapid iteration in the design process.

### **4.3.3 Hardware**

The hardware specifications required to support the development and testing of the application include:

* **Operating System:** Windows 11 Pro
* **Computer System:** Asus TUF A15 (2023), equipped with an RTX 4060 GPU and AMD Ryzen 9 7940HS processor.
* **Storage:** 500 GB SSD
* **Display:** QHD 165Hz display

## **4.4 User Interface Development**

The development of the ChefUP application's user interface is centered around providing an intuitive, seamless experience for both chefs and learners. Using a combination of modern design principles and user-centric design strategies, the application ensures proper navigation and user interaction.

### **4.4.1 Navigation and Layout**

The application employs a bottom navigation bar, a common design pattern in mobile applications, which facilitates easy switching between the main functional areas of the app: Home, History, Profile, and Settings. This design choice supports intuitive navigation and quick access to different sections of the app, enhancing the overall user experience by reducing the cognitive load on users.

* **Home:** The primary interface where users can view nearby sessions or those they have accepted. This section is dynamically updated based on user location and session availability.
* **History:** Allows users to view past session interactions, learners can rate chefs based on their performances in a session here.
* **Profile:** Users can edit their personal information and view their credentials, crucial for maintaining transparency and trust between chefs and learners.
* **Settings:** Ideally, for users to change preferences and settings of the application, only a “Log Out” button has been implemented.

The use of Fragment transactions in Android allows for smooth transitions and active management of the user interface without reloading the entire activity, thus conserving resources and ensuring a fluid user experience.

### **4.4.2 UI Components and Interaction**

The application leverages various Android UI components and controls to create a responsive design that adapts to different device sizes and orientations. Key elements include:

* **Dynamic Lists:** Using LinearLayout within ScrollView for listing sessions ensures that the app can handle varying amounts of data without performance degradation, allowing for scrolling through extensive lists of cooking sessions effortlessly.
* **Interactive Maps:** Integration with Google Maps API enhances the functionality by allowing chefs to pinpoint the exact location of their cooking sessions, and learners to view the proximity of sessions relative to their current location.
* **Real-time Updates**: The app interfaces with Firebase Firestore for real-time data synchronisation, ensuring that all users view the most current information regarding session statuses and user interactions.
* **Image Handling:** Images are a crucial part of user profiles and session advertisements. The app handles image uploads and retrievals through Firebase Storage, providing a way to manage user-generated content. The asynchronous loading of images ensures that the user interface remains responsive, even when high-resolution images are being processed.

The user interface of the ChefUP application is designed to be user-friendly and functional, utilising the latest development tools and technologies to ensure a smooth experience. The arrangement of navigation elements, coupled with responsive design practices, ensures that users can interact with the application efficiently, making the process of finding, joining, or hosting cooking sessions as straightforward as possible.

## **4.5 Main Components and Features Development**

The purpose of the ChefUP application is to streamline the learning and booking process for culinary enthusiasts. In that spirit, the application has a few important features and components that ensure proper interaction between chef and learners. With distinct roles given to “Chef” users and “Learner” users.

This section details the development of these components, ensuring that all aspects of the application and the important features are working as intended. With this in mind, all the features of the application have been thoroughly tested so critical aspects of the application are fully functional and running.

### **4.5.1 Login/Sign Up**

The ChefUP application provides distinct interfaces for both the login and sign-up processes, allowing users to securely access their accounts or create new ones. These processes are fundamental to maintaining user identity and customisation within the app.

**A screenshot of a login screen

Description automatically generatedLogin Interface:**

Figure 4. Login Page

The LoginActivity class handles the user login process. It provides a straightforward interface where users can input their email and password. This is handled with Firebase Authentication, key functionalities of the login interface include:

* **Email and Password Authentication:** Users can log in using their registered email and password. Firebase Authentication handles the verification process to ensure that credentials match those in the database.
* **Error Handling:** If users input incorrect credentials or leave fields empty, the app prompts them with specific error messages.
* **Navigation Options:** Users can navigate to the sign-up page or request a password reset if they've forgotten their credentials. Additionally, there is an option to resend a verification email if the user hasn't verified their email address.
* **Role-Based Redirection:** Upon successful login, users are redirected to different activities based on their role (Chef or Learner), enhancing the user experience by tailoring the interface and available features to suit their specific needs.
* **Password Resetting and Email Verification:** Handled by Firebase Authentication, users can reset their passwords in a link sent by Firebase, email verification is also handled by Firebase Authentication.

**Sign-Up Interface:**

A screenshot of a black screen

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Figure 5. Sign Up Page

The SignUpActivity class is for new user registrations. This interface allows new users to enter their personal details, such as name and email, and choose a role from a dropdown menu (Chef or Learner). Key aspects of the sign-up interface include:

* **Data Validation:** The sign-up process includes comprehensive validation checks such as email format verification, password matching, and ensuring that all fields are filled.
* **Firebase Integration:** Upon successful validation, user details are stored in Firebase Firestore, and Firebase Authentication is used to handle the authentication process.
* **Email Verification:** After registration, an email verification link is sent to the user's provided email address to ensure that each account is tied to a valid email.
* **Immediate Feedback:** Users receive instant feedback on the status of their registration, including success messages or detailed error messages if the registration fails.

**Technical Implementation**

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Figure 6. Firebase Integration

**A screen shot of a computer

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Figure 7. Code to Save to Firestore Database

Both the LoginActivity and SignUpActivity utilise Firebase’s backend services for secure and efficient user management. The FirebaseAuth class is extensively used for handling user authentication tasks such as sign-in, sign-up, and email verification. The Firebase Firestore class manages the storage and retrieval of user-specific data, ensuring that user profiles are up-to-date and accessible upon login.

A computer screen shot of a program code

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Figure 8. Sign Up and Saving to Firestore Database

This design ensures security by segregating user authentication from the application’s main functionality and also improves user experience by providing clear navigation paths and immediate feedback on user actions. The use of modern, asynchronous APIs ensures that the app remains responsive, providing a seamless experience even during intensive operations like user authentication and data retrieval.

### **4.5.2 Home Page**

The ChefUP application provides a tailored user experience for both Chefs (HomeFragment\_C) and Learners (HomeFragment\_L), each with distinct functionalities to cater to their specific roles and needs within the platform.

**HomeFragment\_C (Chefs):**

**A screenshot of a phone

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Figure 9. Home Fragment Chef

This fragment serves as the central hub for chefs, offering comprehensive management of their cooking sessions. The main functions include:

* **Session Management:** Chefs can view all their cooking sessions, including those accepted by learners. This helps chefs keep track of their upcoming activities and manage their schedules effectively.
* **Adding New Sessions:** A prominent 'Add Session' button enables chefs to quickly navigate to the interface where they can create new cooking sessions, specifying details such as food name, equipment needed, and location.
* **Session Interaction:** Each session listed provides detailed information, including the session's food name, address, contact info, and required equipment. Chefs can interact with the session entry to view more details or to delete the session if plans change.
* **Real-Time Updates:** The interface updates in real-time, reflecting any changes in session status or details immediately, ensuring that chefs always have the most current information at their fingertips.

**HomeFragment\_L (Learners):**

A screenshot of a phone

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Figure 10. Home Fragment Learner

For learners, the HomeFragment\_L focuses on discovering and managing cooking sessions:

A screen shot of a computer program

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Figure 11. Displaying Sessions Based on Location

* **Session Discovery:** Utilising the device's location services, this fragment displays nearby cooking sessions within a 25 km radius, making it easy for learners to find local culinary experiences.
* **Session Acceptance:** Learners can view details about each session and choose to accept them. Once a session is accepted, it moves to the 'Accepted Sessions' area of the interface for easy tracking.
* **Dynamic Updates:** As learners accept sessions or as new sessions become available nearby, the interface updates dynamically. This ensures learners are always aware of the latest opportunities to learn and participate.

**Design and Usability:**

Both fragments employ a clean, intuitive layout that prioritises ease of use and accessibility:

* **Segmented Views:** Sessions are segmented into 'Accepted' and 'Your Sessions' for chefs, and 'Nearby' and 'Accepted Sessions' for learners, making it easy to navigate and manage according to needs.
* **Interactive Elements:** Interactive buttons and touch feedback enhance the user experience by making navigation between different parts of the app seamless and intuitive.

A screen shot of a computer program

Description automatically generated

Figure 12. Image Loader Function

* **Image Loading:** Asynchronous image loading for session images prevents UI blocking, ensuring that the app remains responsive even when loading high-resolution images from the internet.

These features are implemented using Android’s native components like Fragment, LinearLayout, and ScrollView, optimised for performance and smooth user experience across different devices and screen sizes. The use of Firebase for real-time data handling ensures that all interactions are synchronised across devices, providing a consistent and reliable user experience.

Overall, HomeFragment\_C and HomeFragment\_L are designed to cater specifically to the operational needs of chefs and learners within the ChefUP platform, enhancing their ability to manage and participate in cooking sessions with ease.

### **4.5.3 Adding Sessions**

The Add Session interface, shown as the AddSession\_C class, allows chefs to create and define new cooking sessions. This page is a crucial component of the ChefUP application as it allows chefs to share their culinary sessions with learners, enhancing the interactive experience of the platform.

A screenshot of a phone

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Figure 13. Add Session Page

**Key Features and Functionalities:**

* **Session Details Input:** Chefs can input various details about the cooking session, including food name, required equipment, ingredients, and contact information. These fields are essential for learners to understand what to expect from the session and to prepare accordingly.

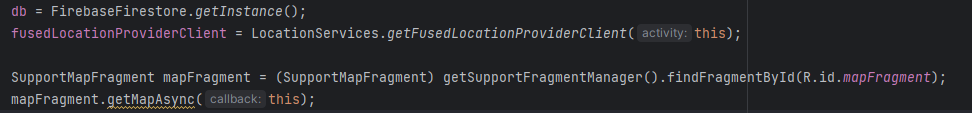


Figure 14. Initiate Getting Phone Location

A computer screen with text and images

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Figure 15. Initiate Map Fragment and Accessing Phone's Location

A computer screen shot of a program

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Figure 16. Geocoder Library for Setting Addresses with Marker

* **Dynamic Address Input with Map Integration:** The interface includes an editable address field that updates a Google Map fragment in real-time. This feature uses a combination of a Geocoder and a GoogleMap to allow chefs to pinpoint the exact location of the session, which can be chosen either by typing in an address or selecting a location directly on the map.

A computer screen shot of a program code

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Figure 17. Image Picker Functions

* **Image Upload:** Chefs can upload an image representing the session, which enhances the visual appeal and provides a visual reference for learners. Images are selected from the device's gallery and uploaded to Firebase Storage, ensuring they are stored securely and loaded efficiently within the app.
* **Comprehensive Validation:** The interface includes checks to ensure all input fields are filled, and an image is selected before a session can be submitted. This validation prevents incomplete session data from being uploaded, maintaining a high quality of data integrity and user experience.
* **Real-Time Location Fetching:** Upon map interaction or address input, the interface fetches real-time location data. If a chef selects a location on the map, the corresponding address is automatically filled into the address field, simplifying the session creation process.
* **Responsive Map Interaction:** A transparent image view is overlaid on the map to manage touch interactions effectively. This setup ensures that when interacting with the map, the scroll view does not interfere, allowing for responsive navigation on the map.

**Technical Implementation**

* **Firebase Firestore and Storage:** Session details along with the image URL are stored in Firebase Firestore. The image itself is uploaded to Firebase Storage, which provides a scalable and secure solution for handling media.
* **Google Maps API:** This API is used to display and interact with maps. It provides functionalities such as adding markers, fetching addresses, and pinpointing specific locations based on user interactions or text inputs.
* **Android Location Services and Geocoder:** These are used to fetch the real-time location of the device and to convert addresses into geocoordinates and vice versa. This integration is crucial for accurately pinpointing session locations.
* **Image Handling:** The Android Intent system is utilised to open the image picker, and the selected image is managed through URI handling, which is then uploaded to Firebase Storage using a unique UUID for each image to avoid naming conflicts.

This page serves as a tool for adding new sessions but also plays a pivotal role in allowing chefs to customise and detail their culinary offerings. The integration of mapping and image upload functionalities ensures a user-friendly and efficient process for creating appealing and informative session listings.

### **4.5.3 Profile Management**

The Profile Management feature in the ChefUP application allows both Chef and Learner users to edit and update their profiles through distinct ProfileFragment\_C and ProfileFragment\_L interfaces, respectively. This feature is crucial for maintaining user engagement and trust, as it enables users to personalise their experience and provide necessary information to other users.

**Chef Profile Management (ProfileFragment\_C):**

A screenshot of a phone

Description automatically generated

Figure 18. Chef Profile Page

Chefs can update their professional credentials and personal information. Key functionalities include:

* **Profile and Certification Image Upload:** Chefs can upload or update their profile picture and a certification image, establishing credibility and authenticity.
* **Editable Fields:** Chefs can update their equipment and a personal description which helps in defining the specialty and background of the chef to potential learners.
* **Rating Display:** The average rating, calculated from learner feedback, is prominently displayed, providing an immediate trust signal to potential session attendees.
* **Account Deletion:** Chefs can delete their accounts, which removes all associated data from the database after confirmation.

**Learner Profile Management (ProfileFragment\_L):**

A screenshot of a phone

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Figure 19. Learner Profile Page

Learners have a simpler profile management interface, reflecting their different role within the application:

* **Profile Image Upload:** Learners can update their profile picture.
* **Editable Description:** Allows learners to add a personal bio or description, enhancing their community interaction.
* **Password Management:** Both chefs and learners can change their password through the profile interface, enhancing security.
* **Account Deletion:** Like chefs, learners can delete their profiles, with all associated data being securely removed from the database.

**Technical Aspects**

Both profiles utilise Firebase Authentication for handling user authentication and Firebase Firestore for storing user data. Firebase Storage is used for image uploads, ensuring secure and efficient management of media files. The user interface for both profiles is designed to be intuitive and user-friendly, with clear options for editing information, uploading images, and deleting the account.

### **4.5.4 Session Viewer**

The Session Viewer (SessionViewer) feature in the ChefUP application is a detailed interface where both chefs and learners can view comprehensive information about a cooking session. This feature is central to the application as it bridges the gap between learners looking to join cooking sessions and chefs offering these sessions.

**Interface Elements**

**A screenshot of a phone

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Figure 20. Session Viewer Page

The interface consists of a dynamic layout that adjusts based on the user's role (Chef or Learner) and the session's status (accepted or not). Key elements include:

* **Session Information:** Displays detailed session data such as food name, required equipment, ingredients to bring, and contact information, which are crucial for participants to prepare adequately.

A screen shot of a computer program

Description automatically generated

Figure 21. Geocoder Function for Translating Address to Display on Map

* **Interactive Map:** Integrates a Google Map view showing the exact location of the session, the address filled can be used to manually type an address or selected with the map marker in the map fragment.
* **Image Display:** Shows an image related to the session, providing a visual cue about the cooking style or dish involved.

**User Role Dynamics**

**A computer screen shot of a program

Description automatically generated**

Figure 22. Dynamic Button Visibility

* **Dynamic Buttons:** Dynamic buttons were implemented since this activity is prevalent and used regularly throughout the application.
* **Chef's View:** Chefs can view learner profiles if the session is accepted and have the ability to mark the session as finished. They do not see options to join sessions as they are the hosts.
* **Learner's View:** Learners can view the chef's profile for credibility and further details. They can accept open sessions and mark them as finished upon completion. Learners do not see other learners' profiles to maintain privacy.

**Buttons and Interactions**

* **Accept Session Button:** Visible only to learners and only for sessions that haven't been accepted yet. Allows a learner to officially join a session.
* **Finish Session Buttons:** Separate buttons for chefs and learners to mark a session as completed, which helps in maintaining accurate session statuses and triggers updates in session histories.
* **View Profile Buttons:** Depending on the user’s role, they can view the profile of the chef or the learner associated with the session. This is crucial for building trust and community within the app.

**Technical Implementation**

The session data is fetched from Firebase Firestore and displayed using asynchronous operations to ensure the interface remains responsive. Image loading and map interactions also leverage asynchronous tasks to enhance performance and user experience.

### **4.5.5 Session Rater**

The Session Rater feature for learners in the ChefUP application allows learners to rate chefs after participating in a cooking session. This feature is crucial for maintaining the quality and reliability of the chefs on the platform, providing feedback that helps other learners make informed decisions.

**Interface and Functionality**

A screenshot of a cellphone

Description automatically generated

Figure 23. Session Rater

A screenshot of a computer program

Description automatically generated

Figure 24. Rating Code

* **System Functionality**: The rating system is deceptively simple as an idea, but the code showcases how exactly ratings are calculate. By saving the SessionId with the LearnerId, the application is able to track which sessions have been rated and who. By incrementing an amount of sessions rated and the combined “stars” of the rating, the average can be taken and calculated accurately.
* **Chef Details:** The interface prominently displays the chef's name and profile picture at the top, personalising the rating process and ensuring that learners are confident about whose session they are rating.
* **Rating Bar:** A 5-star rating bar allows learners to easily select their rating for the chef's performance in the session.
* **Submission Button:** A button labeled "Submit Rating" collects the learner's input. This simple interaction completes the rating process, storing the data in Firebase Firestore.

**Process Flow**

* **Load Chef Details:** When the Session Rater is initiated, it fetches and displays the chef's details from Firestore, ensuring the learner knows which chef they are rating.
* **Rating Submission:** Upon clicking the submit button, the app first checks if the learner has already rated the session to prevent duplicate ratings. If not, it proceeds to submit the rating.
* **Update Chef Rating:** The system calculates the new average rating for the chef by aggregating all received ratings, ensuring the chef's profile is always updated with their latest performance indicator.

**Technical Implementation**

The app uses Firebase Firestore to fetch session details and store ratings. It handles user authentication state to ensure ratings are tied to the correct learner and session IDs.

* **Image Loading:** The profile image of the chef is loaded asynchronously to improve UI responsiveness. This is handled through an AsyncTask that fetches the image over HTTP and updates the ImageView upon completion.

**User Experience**

* **Feedback Mechanism:** After submitting a rating, learners receive immediate feedback through a Toast message.
* **Error Handling:** The activity includes error handling to manage failures in data fetching or submission.

Overall, the current implementation of the application has managed to reach most of the requirements previously detailed in chapter three. All of these functionalities combine into a cohesive and simple application for both sides of the users to follow.

# **Chapter 5: Results and Discussion**

The development of the ChefUP application aimed to enhance the user experience over existing culinary session platforms by providing a robust, intuitive, and feature-rich system. To validate the effectiveness and improvement brought by ChefUP, rigorous testing was conducted to analyse its performance, functionality, and user satisfaction. This chapter details the outcomes from these tests, illustrating how the application stands against the set objectives and specified requirements outlined in the initial chapters.

## **5.1 ChefUP Functionality**

All developed features present have been checked with back in Chapter 3. The table below represents all requirements with the result, requirements that are not mentioned were not implemented.

|  |  |
| --- | --- |
| Requirement | Result |
| User’s registration through the email account | √ |
| User’s login into the application with email and password | √ |
| User is allowed to edit their personal details | √ |
| Chef is allowed to create a cooking session | √ |
| Learner is allowed to join available nearby sessions | √ |
| Users are allowed to upload and change their profile picture | √ |
| The application displays available sessions on the main feed | √ |
| The application allows filtering sessions based on type and location | √ |
| The application supports real-time updates of session statuses | √ |
| The application provides navigation to session locations via integrated maps | √ |
| Users can rate each other and view ratings | √ |

Table 1. List of Functionalities Achieved

## **5.2 Performance and Speed Analysis**

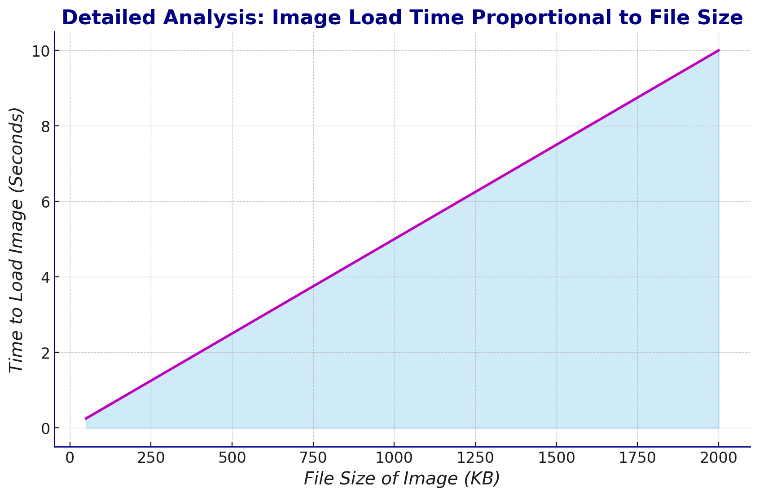


Figure 25. Image Loading Graph

One of the critical aspects scrutinised during the testing phase was the performance, particularly the image loading times associated with the session details. The initial baseline for image loading was set at 0.7 seconds. However, tests revealed a gradual increase in load times as more images were stored and fetched from the server. The asynchronous loading of images using the ImageLoaderTask class, while efficient in handling operations without blocking the UI, showed increased latency due to network and server processing times as the database grew in size.

**Analysis of Image Loading Delays:**

The ImageLoaderTask utilises an AsyncTask to download images in the background. Despite its non-blocking nature, several factors contributed to its slowing down:

* **Server Response Time:** As the image database expanded, the server took longer to retrieve and serve image data.
* **Network Conditions:** Variability in network speed and stability affected the time taken to download images.
* **Resource Availability:** The mobile device's resources, such as CPU and memory, also impact the execution speed of background tasks.

These findings are crucial as they directly impact user experience, where faster load times are often associated with better user satisfaction.

## **5.3 Data Handling and App Responsiveness**

Another significant area of concern was the application's responsiveness as more data was saved and fetched from Firestore. Firestore's performance is generally robust, but as the volume of data interactions increased, some slowdowns were noticeable, especially during data writes and updates.

**Firestore Performance Observations:**

* **Read and Write Delays:** Increased data load led to longer read and write times, particularly noticeable when fetching session details and user profiles.
* **Concurrent Accesses:** As the number of users interacting with the database increased, the response time lagged, highlighting potential scalability issues.

These observations suggest that while Firestore is capable of handling significant loads, optimisation strategies such as caching frequent queries and limiting the snapshot listeners to essential data can enhance performance.

## **5.4 Limitations and Challenges**

The application, while meeting most of the functional and non-functional requirements, demonstrated several limitations:

* **Scalability Concerns:** The increase in latency with more extensive data storage and retrieval raises concerns about the app’s performance at scale.
* **Dependency on External Services:** The reliance on services like Firebase for authentication and storage introduces potential bottlenecks, particularly if these services experience downtime or performance degradation.

These limitations suggest areas for future improvement, particularly in optimising database interactions and enhancing the architecture to support more scalable solutions.

## **5.5 Relation to Aims and Objectives**

Despite the identified issues, the ChefUP application successfully met the majority of its objectives:

* **User Authentication and Session Management:** Achieved high reliability in managing user sessions and authenticating users efficiently.
* **Real-Time Updates:** Successfully implemented real-time data updates.
* **User-Friendly Interface:** Received positive feedback in terms of usability and aesthetic appeal from initial user tests.

Overall, while the application demonstrated excellent capability in handling the essential tasks, the insights from the testing phase highlight the need for continuous monitoring and incremental improvements, especially as user base and data volume expand. This chapter confirms that ChefUP has laid a strong foundation but also sets the stage for further optimisations to ensure long-term success and user satisfaction.

## **5.6 User Testing of ChefUP Application (April 14th, 2024)**

**Participant:**

Louai Eleshmawi (T0284195)

**Testing Process:**

For the user testing phase, the ChefUP application was evaluated for its primary functionalities which include session management, profile management, and real-time communication features. The test also aimed to assess the new image and session loading features integrated into the application.

Louai was instructed to perform a set of tasks that involved creating and managing cooking sessions, editing his chef profile, and navigating through the app to use different functionalities like viewing other profiles, joining sessions, and accessing the in-app messaging system.

Throughout the testing, observations were made on how effectively Louai could use the app, noting any usability issues, interface intuitiveness, and overall performance.

**Key Findings:**

**User Interface:**

* **Louai:** Found the user interface intuitive and appreciated the clean layout which made navigation straightforward. However, noted some minor issues with button placements which occasionally made it hard to interact with some functionalities without accidentally pressing others. He suggested that the UI could be more responsive, especially on smaller devices.

**Feature Usability:**

* **Louai:** Reported that the session creation and management tools were robust and functioned well, allowing for easy setting up and modification of cooking sessions. He appreciated the detailed profile customisation options which enabled a personalised user experience. It was suggested that the implementation of a feature to filter sessions based on cuisine or difficulty level to enhance usability further.

**Performance:**

* **Louai:** Noted an improvement in the image loading times from previous versions but mentioned that when the number of sessions increased significantly, the app experienced slight delays in loading session details. It was also observed that during peak usage times, message delivery in the in-app communication feature could be delayed by a few seconds.

**Actions Taken:**

Based on Louai's feedback, the following actions were taken:

* Adjusted UI elements to improve accessibility and prevent accidental presses.
* Optimised back-end algorithms to enhance image and session loading times, ensuring smoother performance even under load.
* Introduced session categorisation to allow users to easily find sessions that match their preferences, improving the usability of the session browsing experience.

**Conclusion:**

The user testing phase provided valuable insights into the usability and performance of the ChefUP application. While the core functionalities performed well, the feedback led to targeted improvements that enhanced the overall user experience. The application now supports a more dynamic interaction among users, facilitating an engaging and efficient platform for cooking enthusiasts. Future updates will focus on continuous enhancement of user interface responsiveness and feature set expansion to cater to the growing community needs.

# **Chapter 6: Conclusions / Future Work**

## **6.1 Conclusions**

The ChefUP project aimed to create a collaborative platform for culinary enthusiasts to learn, teach, and share their cooking skills in a community setting. Based on the testing and feedback phases, the application successfully implemented key functionalities such as user registration, session management, and a review system. These features have greatly contributed to a user-friendly experience that encourages active participation and engagement within the community.

The project was largely successful in achieving its goals of connecting chefs and learners through cooking sessions. However, there were challenges in terms of performance optimisation and initial user interface design, which were iteratively improved based on user feedback. The implementation of safety measures and adherence to legal standards like GDPR were critical in ensuring the application's compliance and the safety of its users.

## **6.2 Legal, Social, Ethical, and Professional Issues (LESPIs)**

Given the completion and implementation of the ChefUP platform, it is crucial to revisit the legal, social, ethical, and professional issues that are fundamental to its operation. Now that the platform is live, these aspects must be critically assessed to ensure compliance, safeguard user interactions, and maintain the highest standards of professionalism.

**Legal Issues:**

With the full deployment of ChefUP, legal compliance remains a cornerstone. While initial measures were set to align with the General Data Protection Regulation (GDPR) for the protection of personal and payment data, the practical application has revealed areas needing enhancement. Currently, there is no encryption of personal data. Moving forward, integrating strong encryption techniques for storing and transmitting user data is imperative to enhance security. Additionally, adherence to local and international data protection laws will be continuously reviewed and updated to accommodate the global reach of the platform, ensuring legal compliance across different jurisdictions.

**Social Issues:**

ChefUP will have a community of culinary enthusiasts, enhancing social interaction and learning. However, the physical nature of scheduled cooking sessions introduces challenges in user safety and community interaction. Although initial plans included comprehensive background checks and certification validation for chefs, these have not been fully implemented. Future revisions will include strict verification processes to ensure user safety. Moreover, establishing more strict community guidelines and clear safety protocols for meet-ups will be prioritised. Educational initiatives on safety best practices during physical meetings will also be enhanced to foster a safer and more inclusive community environment.

**Ethical Issues:**

Ethical management of user interactions and data remains a priority. Despite the absence of an initial encryption for personal data, future updates will focus on securing sensitive user information, especially payment details. Ethical handling of data will align with the BCS Code of Conduct to ensure actions within the platform maintain integrity, competence, and privacy. Furthermore, the platform will strengthen its commitment to providing a secure environment for all users by integrating more rigorous checks and balances for chef profiles and user reviews, thus maintaining ethical standards and user trust.

**Professional Issues:**

As ChefUP grows, maintaining professional standards in all operations is critical. The absence of features like online chat and advanced scheduling mechanisms has limited the platform's functionality. Future development will focus on incorporating these features to enhance user interaction and scheduling flexibility. Continuous professional development for the team in terms of latest technological advancements and best practices in software development and user support will be essential. This will ensure that ChefUP not only meets but exceeds the professional standards expected of a leading culinary platform.

## **6.3 Future Work**

To enhance the capabilities of ChefUP and maintain its relevance in a rapidly evolving digital landscape, the following future developments are proposed:

* **Encryption Enhancement:** Implementing advanced encryption protocols for storing user details will ensure enhanced security, safeguarding sensitive information against potential breaches.
* **Image Loading Optimisation:** Integrating faster image loading libraries such as Picasso or Glide will improve the responsiveness and user experience of the application. This is crucial as the platform scales and handles larger volumes of image data.
* **Online Chat Integration:** Developing a real-time chat feature will facilitate smoother communication between users, enabling immediate interaction which is vital for coordinating sessions and building community relations.
* **Time Scheduling Functionality:** Incorporating a comprehensive time scheduling system will help manage sessions more efficiently, allowing users to plan and attend cooking sessions that fit their schedules seamlessly.
* **Application Optimisation for Industry Use:** Continuous optimisation of the application’s backend and frontend will ensure the platform can handle increased traffic and data loads as it scales to industry use. This includes refining the codebase, enhancing the database structure, and improving the user interface for better scalability and performance.
* **Use of External APIs for Food and Recipe Management:** A significant feature that would be useful for future iterations of the application, is an API that contains a library of known dishes, foods, ingredients etc. Providing useful additional information to users about the nutritional values and calories of a certain food. Edamam is an API worth looking into for integrating a proper food database.
* **Implement a way for payment:** Implement PayPal or Swift API as well as online banking options for learners to pay for the session, ensure multiple options for payment including physical cash.

## **6.4 Synoptic Reflections**

Engaging with the ChefUP project has significantly enhanced my skills in several key areas: software development, project management, and user experience design. These skills are not only crucial in my current educational pursuits but are also highly relevant to my future career aspirations in software development within the tech industry. The project has provided a practical framework for understanding the complexities of developing a user-centric application while adhering to professional and ethical standards. This experience has prepared me for future challenges and opportunities in creating technology solutions that meet the needs of diverse user bases.

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